BISTON BETULARIA L. (LEP.: GEOMETRIDAE): MELANISM IN DECLINE?

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B. betularia has taken a considerable share of the research into industrial melanism in Britain, and three chapters are devoted to this species by B. Kettlewell (*The Evolution of Melanism*, 1973), these relating in part to the genetics and geographical distribution of the three main forms of the insect -- f. *typica, carbonaria* Jdn. and *insularia* Th.-Mieg, which he describes as a complex of genetically distinct morphs intermediate in appearance between f. *typica* and *carbonaria*, and for his own research categorized as *insularia*^{1} to *insularia*^{5} in order of increasing speckling. Unfortunately, in appearance, f. *typica* and *insularia* grade into each other so that often identification is purely subjective, thus rendering statistics concerning them suspect, especially when more than one observer is involved.

Kettlewell summarizes the melanistic trends in *betularia* for the period 1952-1970 as follows, '... f. *insularia* is increasing in a few somewhat specialized areas, and f. *carbonaria* only in peripheral districts of recent urbanization . . . ' Further, he states that, somewhat surprisingly, smokeless zones are having an effect and that *betularia* is for the first time in a hundred years reversing its trend to melanism, even though no vegetative lichens have reappeared. He suggests that the reverse trend will occur in the opposite order to its development, i.e. *carbonaria* → *insularia* ^{5} → → *insularia*^{1} → f. *typica*. In view of this I am surprised to have noticed only very occasional reference to *betularia* in relation to melanism during the past ten years or so, particularly considering the continued amelioration of the environment from decreasing atmospheric pollution in many parts of Britain.

For many decades N. W. Kent suffered heavy atmospheric pollution by virtue of its close proximity to London, and its relative position in regard to the prevailing winds, with the industries, particularly cement, of lower Thames-side, providing additional pollution when the wind was easterly. The region is now a Clean Air Zone as defined by the 1964 Clean Air Act, but even at that time the dust deposits, excluding cement, were well below the national average. Subsequently further progress has been made with the decline of heavy industry, change from coal to oil as industrial fuel, the elimination of cement pollution, and the use of electricity as the source of power in the new light industry development.

I have kept records of the frequency of the various forms of

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betularia to visit my m.v. light at Dartford since 1969. Unfortunately there are no figures for the area prior to this, although there are for Bromley and Orpington five miles to the south-east. Kettlewell quotes figures for the incidence of *carbonaria* in various localities in the Home Counties prior to 1970 as high as 80% to 90%, and I suspect that this was the case here for specimens of *betularia* encountered at rest or bred from feral larvae were invariably melanic; typical *betularia* appeared to be rare.

I have noted above the suggested order in which melanism would show decline in this species, but if one refers to plate 7.1 in Kettlewell's *Evolution of Melanism* one finds that *carbonaria* in the late nineteenth century are quite unlike those of to-day, particularly in possessing a white postmedian line on the forewing. On 12.vii.1977 one of this form visited my garden m.v. light, a form I had never seen before, except for those in the National Collection. Subsequently several others have arrived, although I have not come across the form elsewhere.

For the period 1970-1985 the figures for the forms of *betularia* seen at my m.v. light at Dartford are as follows:—

	% typica	% insularia	% carbonaria	Yearly sample
1970-1973	14.5	7.5	78	119
1974-1977	10.5	13	76.5	107
1978-1981	17	11	72	99
1982-1985	19	16.5	64.5	102

In each of the years a significant number of *betularia* appeared at the light, the lowest number being 63 in 1971, and the highest 176 in 1981. The highest numbers for *carbonaria* were reached in 1981 (81%), 1974 and 1976 (80%), while the lowest for this form occurred in 1980 (60.4%) and 1985 (57.9%), the latter year giving also the highest percentages for both the other forms.

Although the figures on a four year basis indicate a steady decline in the incidence of *carbonaria*, the individual yearly figures show irregularities, no doubt in part due to the size of the samples. Some increase in both *typica* and *insularia* is indicated, but in view of the subjective nature of differentiating these, in a number of instances, perhaps one should not draw conclusions.

Melanism may be in decline so far as *betularia* is concerned, but this connot be said of all species. The melanic forms of *Dasychira pudibunda* L. seem to be commoner now, although the first record for Kent was as late as 1948, compared with 1901 for *carbonaria* (Chalmers-Hunt: *Butterflies and Moths of Kent* **3**); this source quotes ab. *nigra* Prout of *Gonodontis bidentata* Clerck

being taken in Kent for the first time as late as 1959, and I first saw it at Dartford in 1973, since when it has become less rare. Like *carbonaria*, these melanic forms are also dominant genetically.

The decline in the relative frequency of *carbonaria* at Dartford indicated by the figures over three year periods does represent a decline of almost 1% per year; it will be interesting to see what the future trend will be, including the rapidity of any changes which may occur. This also applies to species in which melanism has appeared in this area only recently, but appears to be increasing. Finally worth mentioning is one common species which at Dartford appears to produce melanic forms to the extent of 100%, this is *Chloroclystis rectangulata* L., although in the 1930s of the many specimens I used to see at rest on the apple and pear tree trunks and adjacent structures in my garden included many of the green typical form; melanic forms of this species were encountered in N. W. Kent as early as the late nineteenth century.

References

Chalmers-Hunt, J. M., 1968-81, *Butterflies and moths of Kent* 3 Arbroath.

Ford, E., 1955, *Moths.*

Kettlewell, B., 1973, *The Evolution of Melanism.*

Thames-side Joint Committee for the Abatement of Atmospheric Pollution, *Reports* 1968-73.

SANGUISORBA OFFICINALIS LINNAEUS.: A FOODPLANT OF BISTON BETULARIA (L.) (LEPIDOPTERA: GEOMETRIDAE) – On 22nd September 1987 I observed one caterpillar of *Biston betularia,* peppered moth, on a plant of *Sanguisorba officinalis* Linn., great burnet, in Honey Slough west field, Fryent Country Park, Middlesex (v.c.21). The caterpillar measured 64 mm in length and of particular note was the camouflage which mimicked the black and whitish discolourations that often occur on great burnet stems at this time of the year. The caterpillar was again observed in different positions or on different stems of the same plant on the 23rd 25th, 26th and 27th September, but was no longer present when the plant was next checked on 4th October. It was evident that leaves were eaten between each observation and in a systematic fashion, with all the leaves on a stem being eaten before the caterpillar moved onto a new stem.

Scorer, A. G. 1913, in his *Entomologist's Log-book* (Routledge) lists *Betula, Cytisus scoparius, Fagus, Prunus, Quercus, Rosa, Rubus fruticosus, Salix, Tilia* and *Ulmus* as larval foodplants of this moth. Allan, P. B. M., 1949, *Larval Foodplants* states that *Bison betularia*